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ABSTRACT

This paper emerged from a conversation between a high school science teacher and a university researcher as they found common ground in the theory and experiences of designing transformative learning experiences. The teacher describes an instructional unit in which students designed a complex, interactive display showing what life may have been like during the Mesozoic Era. The researcher and the teacher illuminate elements of design within the activity offering explanation for the power and effectiveness of the pedagogical activity. The paper looks at learning and design as a transformative process of acting on and being acted on by the world that goes beyond pure cognition. Through the production of a communicative artifact, design allows students to experience the power and beauty of ideas (connecting science, aesthetics, and inquiry) within a community of learners. (Contains 29 references.) (Author/SLD)

Designing learning through learning to design[1]

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3/15/00

[1] Paper presented at the annual meeting of the American Educational Research Association. New Orleans, LA, April 2000.

Abstract

This paper emerged from a conversation between a high school science teacher and a university researcher as they found common ground in the theory and experiences of designing transformative learning experiences. The teacher describes an instructional unit in which students designed a complex, interactive display showing what life may have been like during the Mesozoic Era. The researcher and teacher illuminate elements of design within the activity offering explanation for the power and effectiveness of the pedagogical activity. We look at learning and design as a transformative process of acting on and being acted upon by the world that goes beyond pure cognition. Through the production of a communicative artifact, design allows students to experience the power and beauty of ideas (connecting science, aesthetics and inquiry) within a community of learners.

Much is written today about design-based learning. Design, as a pedagogical activity, has come to be perceived as forward-looking, reform-oriented, and progressive. Reformers and writers commonly support design-based learning for its authentic outcomes and activities, and collaborative and cross-curricular nature. We believe these are rather surface-level characteristics of design-based learning and offer instead three much deeper, psychologically-based characteristics to support the efficacy and potential of design-based learning.

This short paper provides a unique illustration of a design-based learning situation in which 40 high school students and their teacher worked to represent life during the Mesozoic age. Student design projects had to: a) communicate (teach) a particular element related to life during the Mesozoic period such as plant and animal life, climate, or physiographic features of the earth's surface; b) provide something for both children and adults to do to help them learn or understand the point being made by the representation, and; c) be scientifically accurate and artistically crafted to provide a unique experience to visitors. Projects were displayed in a community open-house referred to as the Mesozoic Resource Center (MRC).

Our paper describes the MRC more completely followed by an analysis of the activity from the perspective of design. The text alternates between elements of the activity of design and illustrations as found in the design of the MRC. The paper ends with brief comments and suggestions about the ability for design to be used successfully in schools and classrooms.

The case of the Mesozoic Resource Center

As I looked around my classroom I saw Reuben, a known gang member, reading a story he had written and illustrated about a young Pachycephalosaurus to five first graders. Chris, an eighteen year old sophomore labeled severely emotionally disturbed, was smiling and enthusiastically debating the feasibility of the asteroid impact theory with our school superintendent. Linda and Becky, both of whom had failed other science classes, were surrounded by several parents as they described the nesting behavior of hadrosaurs.

This was the scene at the opening of my classes' Mesozoic Resource Center. Forty high school science students and I had been working diligently for ten weeks in preparation for this evening. We had set up displays on both floors of our unusual two-story classroom. Downstairs visitors browsed through student constructed displays ranging from the diversity of pterosaurs to a debate over whether dinosaurs

were warm or cold-blooded. Students manned their displays clarifying ideas and offering additional information to visitors as they passed.

In one corner, elementary children were invited to excavate dinosaur toys from a simulated paleontological dig, pour resin over insects to simulate the famous mosquito stuck in amber from Jurassic Park, or use a rubber stamp kit to construct their own dinosaurs. Each group was closely supervised by my students.

Upstairs, another group was conducting tours of a lost age. Guides assigned to each period, Triassic, Jurassic, and Cretaceous, led visitors through their respective age describing the plants, animals, and climate of that time. Visitors stood stunned at the bleakness of the dry, sandy, desert-like surroundings in the Triassic, marveled at the 8 meter long Apatosaurus model being eyed by the head of a Parasaurolophus peering through ferns and lush greenery, and were amazed by the 3 meter tall Tyrannosaurus Rex model glaring down at them as the first flowering plants appeared in the Cretaceous Period. The sights and conversation were academic, enthusiastic, and engaging for everyone involved.

The evening described is not some ideal vision of an interactive museum. It was my high school science class. In teaching geology, I had a group of students interested in learning about dinosaurs. What started as a trial in self-directed learning exploded in both size and scope. Before I knew it, these students, most previously characterized as disinterested, unmotivated, and apathetic, were tearing down the walls of traditional learning. In its place they built a community of scholars each working towards understanding and communicating what life was like millions of years ago in the Mesozoic Era. I could barely keep up.

It took me almost a year to realize what a unique experience this was. At the time, I was too wrapped up in the details of executing the large-scale project but after thoughtful reflection I have begun to understand the power of this unit.

As a relatively new teacher, I had few resources and even less personal knowledge about dinosaurs. I chose to involve my students, as well as myself, with a book by David Norman called Dinosaur! (Norman, 1991). It is filled with information about current thinking regarding dinosaurs and is richly illustrated. We supplemented our reading with the four-part A&E television series by the same name. In areas where these two sources were insufficient in providing enough information, students consulted our school library, the internet, local experts, university libraries, and even college professors. Just learning how to gather information was a worthwhile experience for many of my students.

We soon realized that to get a complete picture of life in the Mesozoic Era we needed to split up and become experts in many different areas. With a little guidance, my students were able to focus their inquiry into very specific topics. With their topic in mind, they had one goal. Each student was to become an expert in a particular area. I challenged each student to develop their knowledge of the subject far beyond mine or anyone else's in our school. These were empowering words for largely disenfranchised students. They eagerly accepted the challenge!

As students' knowledge grew it became clear that I had to find a way to showcase their work. Because of some recent negative press regarding gang violence and drug abuse in our school and community, this high school needed something about which to feel good. As student work began to blossom and our ideas and goals became more lofty, I envisioned a public display of this rich knowledge and understanding. Our simple dinosaur projects became the Mesozoic Resource Center described above.

Ready to show off their products, my students suggested that I call the local newspaper and television station. To our surprise, both agencies were eager to come and do short stories. Everyone was thrilled to be on television but the pressure to look and sound impressive was mounting. The television crew arrived a couple of hours before the grand opening as my high school students were hosting groups of second and third graders from our local elementary school. One of the requirements for each student display was it must have something for both child and adult visitors to do. In this case, the elementary teachers examined the computer-generated overlays describing dinosaur anatomy while children distinguished Ornithischians from Saurischians using models from the Carnegie Collection.

By far, the biggest hit of the Mesozoic Resource Center was the walk-through-diorama showing how life might have been during the each of the three periods of the Mesozoic. Together with my students and our school janitors, we had built fake walls of black plastic to separate the ages. Across several weeks we hauled in 500 gallons of sand and rocks to spread across the floor. Students working on the diorama spent two Saturdays hauling brush, driftwood, and small shrubbery to "plant" in our 200 million year old setting. Our local florist donated several large boxes of ferns to add to the realism. With back lighting and sound effects piped in through a hidden stereo system, our diorama became very impressive.

The highlights of the diorama were two very large dinosaur models built and assembled by my students. We ordered balsa wood snap-together models from a supply house and traced each of the pieces. Using an opaque projector and very steady hands, six students made patterns of dinosaur bones

approximately 1/4 normal scale. The students traced the patterns onto sheets of plywood, and using jigsaws, cut them out. After sanding and painting all the pieces and using a few bolts and clamps, we assembled these massive dinosaur models in their appropriate time periods.

Second only to the huge dinosaur models in impressiveness were two dinosaur heads painted in exquisite detail. A student who was an avid hunter found a taxidermy magazine that sold closed-cell styrofoam forms of dinosaur heads. Taxidermists buy and display them on their wall in jest like any other trophy animal. But this student imagined the heads mounted on the wall peering out of bushes that would be planted in front. After airbrushing the forms to amazing realism, the effect was quite startling. Imagine walking through a darkened classroom, marveling at the magnitude of the dinosaur models in front of you, listening intently as students explained the hunting habits of small, carnivorous dinosaurs, and then suddenly eyeing one, head sticking out of some bushes lit by a soft green glow. The effect was fantastic. In fact, one first grader wet his pants!

A conceptualization of "design"

Design activities are one class of activities that fall under the broader rubric of project-based activities. In such activities, students design complex interactive artifacts to be used by other students for learning about a particular subject (Harel, 1991). Design-based projects have involved the development of presentations, instructional software, simulations, publications, journals, and games (Carver, 1991; Guzdial, 1993; Kafai, 1995, 1996; Lehrer, 1991). With such projects, students learn both about design—through the process of developing complex artifacts—and a variety of academic disciplines, such as programming, social studies, language arts, etc.

Research and theory suggest that design-based activities provide a rich context for learning (Willet 1992). Within the context of social constructivism (Cole, 1997; Vygotsky, 1978) or constructionism (Papert, 1991), design projects lend themselves to sustained inquiry and revision of ideas. Other scholars have emphasized the value of complex, self-directed, personally motivated and meaningful design projects for students (Blumenfeld et. al. 1991, Collins, Brown & Newman, 1990, Harel & Papert, 1990, Kafai, 1996). Such design-based, informal learning environments offer a sharp contrast to regular classroom instruction, the effectiveness of which has been questioned by many scholars (Papert, 1991, 1993; Pea, 1993; Lave & Wenger, 1991). As

one might imagine, adapting such open-ended problem solving situations into the structure and organization of the conventional classroom is often difficult.

Design, broadly speaking, can be seen as "structure adapted to a purpose" (Perkins,1986, p. 2). Perkins' definition captures elegantly an essential quality of design: it is a process of constructing artifacts that exhibit "goodness of fit." Design can be seen both in material artifacts, such as a hammer or a piece of software, as well as in non-material artifacts, such as a poem, a theory or a scientific experiment. This conceptualization of design can play itself out within multiple contexts. In the MRC project, for instance, students designed complex educational artifacts based on their understanding of important ideas in science and art. Further, they acted as social scientists designing usability studies and evaluation tools to test how their exhibits were used by exhibit visitors.

At another level, this idea of design applies to us as educational researchers attempting to better understand the pragmatic and theoretical aspects of developing design-based activities. In essence, our perspective sees design as being both "an object of study as well as context for a study of learning" (Kafai 1996, pg. 72; see also Mishra, Zhao & Tan, 1999). This view of design as adaptation generates several significant implications that can help us understand the pedagogical value of design-based learning activities. We discuss these implications in terms of our study of the MRC.

One of the most interesting aspects of the MRC project has to do with the multiple levels of understanding that were required for completing the design task. Students gained a deep understanding of the core ideas of deep-time and evolutionary biology, and the manner in which they play out in different domains. Students also developed strategies and techniques to help others learn these concepts through their exhibit. This required them to think beyond the science concepts to consider ways in which others would generate their own understandings of these ideas. Further, students needed to develop technological skills in order to construct the artifacts that embodied their ideas. To understand this, we took the design experiment approach (Brown, 1992), focusing on the following social and cognitive aspects of the design activities to help us interpret what we observed:

- The role of knowledge in design, technology, and subject matter content in learning to design, the patterns of interaction among knowledge in different domains
- The role of audience, mentors, leaders, collaborators, and peers in learning and design; patterns of interaction, both face-to-face and online and their effects on learning and design
- The role of artifacts and ideas as tools for construction, expression, communication and inquiry
- The nature of representation and manipulation of symbols in the process of design

As these aspects of the design experiment approach suggest, design works at multiple levels; thus, understanding what happened in this classroom requires analysis at multiple levels as well. This project is based on a social constructivist view of learning and our research design is informed by naturalistic research in education and sociology. This is particularly important in the context of a systemic phenomenon such as design. Within such a perspective, the unit of analysis is not merely the individual, but rather the interaction of the learner, the practices, the resources being used, the community within which these practices are nested and the constraints of the situation—i.e. the intersection of individual, activity, and context (Lave & Wenger, 1991; Roth, 1998).

We now turn specifically to three themes that emerge from our theoretical perspective as applied to the process of design-based learning. Each theme is further illustrated by a brief vignette drawn from student experiences during production of the Mesozoic Resource Center. The vignettes are designed to be broadly representative of the experiences of students' learning. They should not be considered atypical or unusual in any way. We could easily have chosen three different stories to illustrate the design themes.

Theme I: Design as a transformative experience

Vygotsky and Dewey emphasize the role of dialogue or interplay in learning. As the individual acts on the environment, the environment also acts upon the individual. Inquiry and learning, like design, are not simply about understanding and assembling materials. They are fundamentally about ideas and transforming oneself and the world through the process of working with those ideas.

At the heart of design is an interplay between theory and practice, between constraints and trade-offs, between designer and materials, and between designer and user/learner. Through this dialogue, meanings and artifacts are defined and understood. The interaction is bi-directional and open-ended.

Design also requires that learners discern the essential qualities of an idea and represent it in a compelling manner. To have new ideas is more than simply labeling or thinking about the world differently; rather, it is to have a new way of *being* in the world. To have an idea is to be more fully alive with thought, feeling, and action. It is to have an "energy-for-action" that is directed by thought and fueled by emotion. The having of a new idea is more than the acquisition or application of information. It is, therefore, critical to have students work with ideas that are inherently empowering and generative.

Story I: Seeing the world differently

Oscar was particularly captivated by the debate over the warm or cold-bloodedness of dinosaurs. After much research on predator to prey ratios, body mass to energy expenditure ratios, and heat dissipation and conservation anatomy and strategies, Oscar literally began to see the world through the eyes of this debate. Oscar told a story about seeing a mouse in his mother's kitchen to illustrate his new-found worldview, "See how it moves in quick, darting motions. I bet it needs to eat all the time because it expends so much energy moving in that jerking way." At our open-house, I overheard him explain to his mother, "Scientists believe these fin-backed dinosaurs actually pumped blood up in this sail-like thing to help cool off or warm up." This uniquely energizing idea had transformed Oscar's world from static observations of nature to more alive and dynamic ways of seeing and experiencing the world. In fact, Oscar enrolled in zoology class the next semester because he said he found animals interesting for the first time in his life. Design put Oscar in contact with powerful, transformative ideas in ways that led him into further inquiry and further educative experiences.

Theme II: Design as inquiry

Design activities create opportunities to learn about the nature of inquiry itself. First, design forces students to pay attention to the process and consequences of their actions. Second, students learn to appreciate the nonlinear, often messy nature of inquiry. Design tasks are often ill-structured and afford many viable solutions. This perspective on knowledge and inquiry is

quite different from the epistemological illusion typically found in classrooms, where problems are well-defined with clear-cut solutions. Additionally, to design is to engage in a fundamentally social activity. Students learn the value of communicating effectively and of attending to the experience of others. The design process requires building and negotiating ideas in a community of practice, just as ideas are generated and validated among practicing scientists. Students become experts in specific domains and share their knowledge with one another. Data gathering, validation, and accurate representation of those data force students to move beyond the constraints of their classroom, and school.

Story II: Imagining the past

The guiding task was to present life in the Mesozoic in as much reality and detail as possible. Rachel, Heather, and Desiree thought deeply about the climate and plant life of the Mesozoic as they were assigned the task of making scenery for the walk-through diorama. They assumed their task would be to examine, and try to reproduce, artwork that portrayed dinosaurs, plant and animal life, and climate in the Mesozoic. However, after some research, they discovered that flowering plants did not appear until the Cretaceous period - no where near the Triassic period in which so many flowers appeared in our textbook! After a few more discoveries of inconsistencies, the three girls embarked on an all-out study of flora, fauna, and climate in the Mesozoic. They wanted their contribution to the MRC to be as scientifically accurate as possible to provide the most authentic experience to visitors. Gradually, their understanding of the period developed and the scenery they produced was stunning in its accuracy and attention to detail. The opportunity to design had forced them to investigate best and most accurate ways to represent their ideas.

Theme III: Design is expression

Design is the process of exploring new ways of being in the world, and hence a deeply personal and expressive act. Design is an inner idea expressed outwardly—it is a private possibility acted upon publicly. Design-based activities, therefore, give students opportunities to bring their own unique interpretations to subject matter ideas. We contend that this idea stands in significant contrast with conventional schooling, where ideas are impressed rather then expressed and where, too often, artistic activity is seen as separate from scientific activity. Too often learning in science is viewed as solely cognitive. We believe the power and beauty of ideas to move and inspire is often disregarded. By allowing students to construct artifacts that are

personally meaningful and communicative we allow students to tap into the aesthetic aspects of learning ideas. It allows students to develop their artistic potential as well, all within the overarching goal of developing expressive and engaging artifacts that communicate to an audience.

Story III: The art of science

Ruben had an incredible talent for art. Typically pensive and brooding, he wasn't interested in the difficult and academic tasks with which the rest of the class was engaged. After a few days considering options, halfhearted attempts, and dead-ends, Ruben remembered one of our goals was to share our findings with the community - in particular K-2 students from our local elementary school. Ruben posed to me his plan to author and illustrate a scientifically accurate story about a dinosaur as it moved through a day in the Cretaceous period. Ruben was able to couch his academic learning in the personal expression of his developing story. The end result was a well-written, conceptually faithful, wildly personalized and expressive story about Packy - a young Pachycephalosaur living and learning 80 million years ago. He joyfully read his story several times to different groups of young, enthusiastic MRC visitors. Ruben, who had been in trouble with the law, drugs, and violence, was newly perceived as a teacher, explorer, and artist by these young children and their parents. Ruben was clearly proud of his accomplishment and through this design process changed both his perceptions of himself and the world in ways that possibly no other school related experience had before.

Discussion

It is clear that not all design (or project based) activities have equal educational value. Merely giving students "something to construct" may keep them busy but it is unclear as to what pedagogical value exists in doing so. We believe the presentation of design (through the thematic triad offered above) offers educators a framework useful in developing project-based experiences for students that can motivate, challenge and teach. We hasten too add that we do not mean teaching in the didactic sense in which a single teacher stands to 'spout wisdom' but rather teaching and learning in the context of a broad educative experience.

We believe that valuable design based projects will be centered on important subject matter ideas that are powerful, generative, and expansive; ideas that move students to see the world in different ways. Powerful ideas lie at heart of science and design based activities allow

students to engage with them in a serious manner, and, most importantly, to act on those ideas in ways that move students out into the world engaged, curious, and poised to learn.

This process of "acting on" an idea happens in two ways: intellectually and physically. Intellectually, the designer engages with the ideas and concepts and attempts to learn more. Physically the designer works with the artifact, modifying, manipulating objects to fit the desired ends. This is essentially a dialogue between ideas and world, between theory and its application, a concept and its realization, tools and goals. We see this dialogue as being at the heart of true inquiry, involving as it does the construction of meaning and the evolution of understanding through a dialogic, transactional process. Thus, sound design-based projects carefully incorporate opportunities for inquiry within them.

Finally, design based activities should hold the artistic/aesthetic aspects of learning as of equal value as the cognitive. Notions of the aesthetic are fundamental to both the intellectual and physical aspects of the design process. Intellectually, students learn to appreciate the beauty of ideas; physically, they learn the beauty of constructing an aesthetically pleasing artifact. In our view, design based projects should offer students opportunities to explore these affective aspects of design and learning and should be rewarded for doing so.

References

Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, 26 (2 & 4), 369-398.

Brown, A. L. (1992). Design experiments: theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences* 2: 141-178.

Carey, S., Evans, R., Honda, M., Jay, E., & Unger, C. (1989). "An experiment is when you try it and see if it works": A study of grade 7 students' understanding of the construction of knowledge. *International Journal of Science Education*, 11, 514-529.

Carver, S. (1991). *Interdisciplinary problem solving*. Paper presented at the American Educational Research Association, Chicago, IL.

Cole, M. (1997). *Cultural psychology: A once and future discipline.* Cambridge: Harvard University Press.

Collins, A. S., Brown, J. S., & Newman. S. (1990). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Cognition and instruction: Issues and agendas* (pp. 453-434). Hillsdale, NJ: Lawrence Erlbaum Associates.

Csikszentmihalyi, M., & Csikszentmihalyi , M. (1997). *Creativity : Flow and the Psychology of Discovery and Invention.* NY: Harper Collins

Dewey, J. (1934). *Art as experience.* New York: Perigree.

Duckworth, E. (1987). *The having of wonderful ideas and other essays on teaching and learning.* NY: Teachers College Press.

Guzdial, M. (1993). *Emile: Software-realized scaffolding for science learners programming in mixed media.* Unpublished doctoral dissertation, Ann Arbor, MI: University of Michigan.

Harel, I. (1991). *Children designers.* Norwood, NJ: Ablex.

Harel, I., & Papert, S. (1990). Software design as a learning environment. *Interactive Learning Environment*, 1 (1), 1-32.

Jackson, P. W. (1998). *John Dewey and the lessons of art*. New Haven: Yale University Press.

Kafai, Y. (1995). *Minds in play: Computer game design as a context for children's learning*. Hillsdale NJ: Lawrence Erlbaum Associates.

Kafai, Y. (1996). Learning design by making games: Children's development of design strategies in the creation of a complex computational artifact. In Y. Kafai & M. Resnick, (Eds.), (pp. 71-96). *Constructionism in practice: Designing, thinking and learning in a digital world*. Mahwah, NJ: Lawrence Erlbaum Associates.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Lehrer, R. (1991). *Knowledge as design*. Paper presented at the American Educational Research Association, Chicago, IL.

Linn, M. C. &. Songer, N. B. (1993). How do children make sense of science? *Merrill-Palmer Quarterly*, 39(1), 47-73.

Mishra, P., Yong, Z., & Tan, S. (in press). Unpacking the black box of design: From concept to software. To appear in *Journal of Research on Computing in Education*.

Norman, D. (1991). *Dinosaur*! Prentice Hall.

Papert, S. (1991). Situating constructionism. In I. Harel & S. Papert. (Ed.) *Constructionism*. Norwood. NJ: Ablex.

Papert, S. (1993). *The children's machine: Rethinking school in the age of the computer*. New York: Basic Books.

Pea, R. (1993). Practices of distributed intelligence and designs for education. In G. Samomon (Ed.), *Distributed cognitions: Psychological and educational considerations*. (pp. 47-87). Cambridge, UK: Cambridge University Press.

Perkins, D. N. (1986). *Knowledge as design*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Prawat, R. S. (1998). Current self-regulation views of learning and motivation viewed through a Deweyan lens: The problems with dualism. *American Educational Research Journal*, 35(2). 199-224.

Roth, W.-M. (1998). *Designing communities*. Dordrecht: Kluwer Academic Publishers.

Simon, H. A. (1969). *The sciences of the artificial*. Cambridge, MA: MIT Press.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.

Willett, L. V. (1992). *The efficacy of using the visual arts to teach math and reading concepts*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

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